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# A CLIENT-SERVER NETWORK FOR MANAGING INTERNET PROTOCOL VOICE PACKETS

5           This invention relates generally to internet telephony, and more particularly to an internet telephony network for managing voice packet data.

Internet Protocol (IP) telephony is the process of converting voice into data packets for transmission on a data network such as a Transmission Control Protocol/Internet Protocol (TCP/IP) or similar type network. The advantage of IP telephony over conventional, dedicated line telephone networks is that instead of relying on a physical telephone link and an associated telephone number identifying that physical link to establish a connection, an IP address directs the call to the appropriate IP device. Moreover, although compatible with the existing Publicly Switched Telephone Network (PSTN) such that local IP telephony networks can receive calls from the PSTN accompanied by the proper conversion device, IP telephony takes advantage of existing data networks such that long distance telephone calls can be made over the internet without incurring long distance charges.

Accordingly, IP telephony, particularly in business applications, has become increasingly popular, and telephones have been expressly designed for use with internet protocol. Conventional telephones, with the assistance of a station gateway that converts the voice signals to data packets, can also communicate using internet protocol. Some IP telephone sets provide a small graphical display for the user's benefit, however, many do not. Therefore, the amount of information available to a user to identify the person calling before the user takes the call is very limited. Typical telephone appliance displays provide at most a telephone number of the calling party and identify on which line the incoming call is received. Moreover, the information available to a user (if any) with respect to the incoming call is extremely limited partially due to the reduced, even lack of, graphical display, but even more so due to the limited intelligence these IP telephony devices have, further limiting the type, amount and manner in which the information can be displayed.

Accordingly, because IP telephony is limited in the amount of information that can be conveyed to a user regarding a caller, management of calls, e.g. taking a call, sending a call to voice mail, and even ignoring a call, is not effectively accomplished. Indeed, even with caller ID readily available making it possible to determine who is calling or being sent to voice mail, there is no way to monitor the remotely located voice mail to listen to the message as it is being left by the caller.

Disclosure of the Invention

The present invention results from the realization that a truly effective client server IP network for managing voice packet data can be achieved in which a terminal proxy server, in response to an incoming IP telephone call, simultaneously sends synchronized signals to a client terminal and to a client terminal controller notifying a user of the incoming call. The client terminal controller, in response thereto, retrieves information about the incoming caller, displays the information for the user and through a graphical user interface responsive to the user, the client terminal controller performs at least one call management task on the incoming voice data packets.

This invention results from the further realization that a voice mail message can be monitored in real time and even interrupted as the message is being left by a caller by establishing a conference call with the voice mail storage device and the caller and dropping the voice mail storage device from the call should the user wish to answer the call.

in 81 The invention features a client-server network for managing IP voice data packets. There is a client terminal for receiving IP voice data packets from a caller and a graphical display for conveying information to a client terminal user. A client terminal controller controls the client terminal. A terminal proxy server, responsive to internet protocol control data packets, simultaneously sends synchronized signals to the client terminal and the client terminal controller to notify a client terminal user of the incoming voice data packets. The client terminal controller, in response the terminal proxy server, retrieves information about the incoming caller and conveys the information to the client

terminal user on the graphical display. A graphical user interface is provided for receiving instructions from the client terminal user. The client terminal controller, in response to the instructions received from the user through the graphical user interface, performs at least one call management task on the  
5 incoming voice data packets.

The client-server network can include a database from which the client terminal controller retrieves the information. The database can include an address book database or the database can include a Lightweight Directory Access Protocol server. The client terminal can include an IP telephone, a set  
10 top box or a personal computer. The client terminal can also include an IP gateway, for converting voice data packets to voice signals and a telephone for receiving the voice signals. The graphical display can include a television screen or a computer screen display.

The present invention also features a method of monitoring a voice mail  
15 message. The method includes sending an incoming telephone call addressed to a client terminal to a voice mail storage device and establishing a conference call between the client terminal and the voice mail storage device.

The method can include muting the conference call between the client terminal and the voice mail storage device, establishing a speech path between  
20 the client terminal and the voice mail storage device or dropping the voice mail storage device from the conference.

The invention features still further a method of automatically updating an address book database. The method includes determining from an incoming telephone call the address of the incoming telephone call and searching a

lightweight directory access protocol server for information corresponding to the address of the incoming telephone call, retrieving from the lightweight directory access protocol server the information corresponding to the address of the incoming telephone call and downloading the retrieved information to an address book database.

The method can further include searching the address book database for information corresponding to the address of origin prior to searching the lightweight directory access protocol server. The lightweight directory access protocol server can be located within a data network.

The invention also features a client-server network for managing IP voice data packets. There is a client terminal for receiving IP voice data packets from a caller and a graphical display for conveying information to a client terminal user. A client terminal controller controls the client terminal and a terminal proxy server, responsive to internet protocol control data packets, sends a signal to the client terminal controller to notify a client terminal user of the incoming voice data packets. The client terminal controller, in response the terminal proxy server, retrieves information about the incoming caller and conveys the information to the client terminal user on the graphical display. A graphical user interface is provided for receiving instructions from the client terminal user. The client terminal controller, in response to the instructions received from the user through the graphical user interface, performs at least one call management task on the incoming voice data packets.

It is therefore an object of the present invention to provide a novel, effective client-server network for managing voice data packets.

An object of the invention having been stated hereinabove which is achieved in whole or in part by the present invention, other objects will become evident as the description proceeds when taken in connection with the accompanying drawings as best described hereinbelow.

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#### Brief Description of the Drawings

Figure 1 is a schematic block diagram generally depicting the client server network for managing internet protocol voice data packets according to the present invention;

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Figure 2 is a block diagram, similar to Figure 1, in which a client terminal controller and an address book are integrated with the terminal proxy server;

Figure 3 is a block diagram, similar to Figure 2, in which a client terminal controller, a display, a graphical user interface and an address book are integrated into a client terminal;

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Figure 4 is a more detailed block diagram of Figure 1 of an embodiment of the present invention in which a client terminal includes an internet protocol telephone and the client terminal controller is incorporated within a personal computer;

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Figure 5 is a block diagram, similar to Figure 4, of another embodiment of the present invention in which the client terminal includes a television set top box and the display includes a television set;

Figure 6 is a block diagram, similar to Figure 4, of another embodiment of the present invention in which the client terminal includes an internet protocol gateway and a conventional telephone;

Figure 7 is a representation of the graphical user interface through which a user instructs the client terminal controller to manage incoming voice data packets according to the present invention;

5 Figure 8 is a representation, similar to Figure 7, of an address book address that can be automatically updated through a Lightweight Data Access Protocol server;

Figure 9 is a flow chart generally demonstrating the operation of the client server according to the present invention;

10 Figure 10 is a flow chart demonstrating the automatic address book updating according to the present invention; and

Figure 11 is a flow chart demonstrating the voice mail monitoring feature of the client-server network according to the present invention.

#### Detailed Description of the Invention

15 The network according to the present invention provides the user of an internet protocol telephony device the ability to originate, answer and manage telephone calls from a personal computer, automatically access a Lightweight Directory Access Protocol (LDAP) server to automatically update an address book database, and monitor and screen voice mail messages while they are being  
20 recorded, as well as interrupt voice mail messages to speak with the caller.

There is shown in Figure 1 a network generally designated **10** for managing voice packet data according to the present invention. Network **10** can generally include a call server **12**, for sending and receiving telephone calls to and from network **10**, and a terminal proxy server (TPS) **14** for controlling both call server



12 and a client terminal 16. Client terminal 16 can include, for example, an internet protocol (IP) telephone, a cable television set top box having telephony capability, or a personal computer, each of which can communicate using internet protocol. Also included within network 10 is a client terminal controller 18 that communicates directly with TPS 14 to control and manage voice data packets, not shown, within network 10. As will be readily apparent to those skilled in the art, TPS 14 is adapted to communicate with client terminals 16 having varying intelligence that operate on protocol types ranging from stimulus (least intelligent, e.g., stationary gateway) to functional (most intelligent, e.g., personal computer).

In communication with client terminal controller 18 is a graphical display 20 which graphically conveys information to a user through a graphical user interface 22 regarding an incoming call. Graphical user interface 22 receives instructions from a user for managing the incoming IP voice data packet telephone call. Graphical display 20, for example, a computer monitor for a personal computer or a television screen used in conjunction with a television set top box, is coupled to an intelligent device (e.g., the personal computer or the set top box) thereby providing graphical user interface capability and permitting much more information to be conveyed to a user. This allows a user to effectively manage telephone calls without going to the telephone. Client terminal controller 18 is also in communication with a data network 24 such as the internet.

In operation, call server 12 receives an incoming telephone message, the call set-up signaling comprised of control data packets, and translates the message into H.323 protocol. The H.323 protocol message contains a directory number and an address number for TPS 14. TPS 14 receives the H.323 protocol

message from call server **12** and translates the message to a suitable application protocol, such as, for example UNISTIM, available from Nortel Networks, Saint John Canada and MEGACO (Media Gateway Control Protocol), which is an industry standard protocol, available from the Internet Engineering Task Force (an industry cooperative) just to name a couple, which contains the address of client terminal **16** as well as other client terminals, not shown. At the same time that TPS **14** converts and sends the message to client terminal **16**, TPS **14** converts and sends a simultaneous message, typically in another protocol such as Remote Method Invocation (RMI), to client terminal controller **18**. The application protocols above are utilized merely to facilitate communication between TPS **14** and client terminal **16** and between TPS **14** and client terminal controller **18**, as will be readily apparent to those skilled in the art, and therefore should not be viewed as limitations to the present invention as any suitable application protocols, including vender specific protocols, can be utilized in accordance with this invention.

TPS **14** sends the converted protocol messages simultaneously so that client terminal **16** and client terminal controller **18** are synchronized; that is, there is no delay between the time when client terminal controller **18** receives the signal of an incoming call and when client terminal **16** receives the signal. In other words, as client terminal **16** indicates to a user that there is a telephone call, for example by ringing, client terminal controller **18** generates graphical user interface **22** such as a pop-up window which appears on graphical display **20** at the same time.

In response to the message from TPS **14** and based on sender information contained within the translated message (e.g., the sender's address), client

terminal controller **18** retrieves information about the caller, identifying the caller. The information retrieval can be accomplished by accessing the user's own address book database **21** or by querying a Lightweight Directory Access Protocol (LDAP) server **23** via data network **24**. The user can then manage the incoming call, for example by answering the call (connecting the call to client terminal **16**), taking a message (connecting the call directly to a voice mail storage device **25** remote from client terminal **16**), taking a message and monitoring the message, or letting the phone ring until the caller is automatically placed into voice mail. The user can also answer the call, and place the new call or an existing call on hold, or bypass voice mail and ignore the call (letting the incoming call ring with no answer.)

Client terminal controller **18** and address book database **21**, as shown in Figure 2, can be integrated with TPS **14** while display **20** and graphical user interface **22** are integrated with client terminal **16**. As shown in Figure 3, however, client terminal controller **18**, display **20**, address book database **21** and graphical user interface **22** can all be integrated into client terminal **16**.

In one embodiment of the present invention, as shown in Figure 4, client terminal **16** can include an internet telephone set, for example an I2004 IP telephone available from Nortel Networks, Saint John, Canada, and client terminal controller **18** can be stored within the memory of a personal computer **18a**. Display **20** comprises a computer screen that displays graphical user interface **22** which can, for example, be a window-based program so that the user can manage the incoming call, using a data input device such as keyboard **18a'** to communicate with graphical user interface **22**, as desired.

In another embodiment of the present invention, as shown in Figure 5, client terminal **16** can include a cable television set top box having telephony capability, and client terminal controller **18** is stored in memory within cable television set top box **16**. Set top box **16** is preferably of the type that enables  
5 access to data network **24** such as the internet and that includes a data input device such as keyboard **16'**.

In still another embodiment of the present invention, as shown in Figure 6, client terminal **16** includes a stationary gateway **16a**, which converts conventional voice signals to IP voice data packets, and conventional telephone **16b**, such as  
10 a touch tone or rotary dial phone.

An exemplary representation of graphical user interface **22** as displayed on display screen **20** is shown in Figure 7. For example, a user might be working with a desk top application on personal computer **18a** (Figure 4). When an incoming telephone call is detected (i.e., the control data packets), call server **12** (Figures  
15 1 - 6) signals TPS **14** (Figures 1 - 6) which in turn signals client terminal controller **18** (Figures 1 - 6). In response, client terminal controller **18** generates graphical user interface **22** using the intelligence of personal computer **18a**, which pops up on display **20**. Graphical user interface **22** displays pop-up window **28a** which includes information **30a** such as the phone number of the incoming caller as well  
20 as personal information **30b** which can be obtained from the user's address book database **21** stored within computer **18a** or from LDAP server **23** via data network **24**.

Once the user has been notified of the incoming call, the user can choose to perform one or more call management tasks on the incoming call by clicking

ANSWER **34a**, which connects the telephone call to client terminal **16** (Figures 1 - 6), TAKE MESSAGE **34b**, which connects the call to remote voice mail storage device **25** (Figures 1 - 6), or TAKE MESSAGE & MONITOR **34c**, which connects the call to voice mail storage device **25** and conferences the user into voice mail to monitor the message as it is being left by the caller.

Graphical user interface **22**, in response to client terminal controller **18**, also indicates the status of an incoming call. For example, if the user has placed an outgoing call, as indicated by window **28b**, the outgoing call can be placed on hold to take an incoming call (window **28c**) and the status of each call is indicated as HELD **36b** and ACTIVE **36c** within respective windows **28b** and **28c**.

Caller information **30a - 30d**, as shown in Figure 8, can automatically be retrieved from address book database **21** (Figures 1 - 6) when an incoming call is detected. Thus, the user can enter important information **30b**, for example personal caller information, such that screen pop-up comments immediately convey information to the user about the caller. Moreover, for first time callers for which no information exists within address book database **21**, the user can automatically update address book database **21** to add the caller's information such as information **30a**, name **30c**, and address **30d** retrieved from LDAP server **23** (Figures 1 - 6).

Referring now to Figure 9, the signaling operation of client-server network **10** will be described in greater detail. An incoming IP telephone call signal (a message comprised of a physical layer, an IP layer, a transmission control protocol layer and an application layer) is first detected by call server **12** (Figures 1 - 6), as described in Block **40**. Call server **12** translates the message to H.323

protocol and in turn signals TPS 14 (Figures 1 - 6). TPS 14, in response to control data packets contained in the application layer, translates the message again, and simultaneously sends a UNISTIM protocol signal to client terminal 16 (Figures 1 - 6) and an RMI protocol signal to client terminal controller 18 (Figures 1 - 6), as described in Block 42, to notify a user that there is an incoming telephone call.

Client terminal controller 18 determines the address, or phone number, of the incoming call from the application layer and queries address book database 21 (Figures 1 - 6), searching for information corresponding to the address detected. If no match is found, controller 18 queries LDAP server database 23 (Figures 1 - 6) via data network 24 (Figures 1 - 6), as described in Block 44, to retrieve caller information, searching LDAP server 23 for information corresponding to the address of the incoming telephone call.

Still referring to Figure 9, client terminal controller 18, via graphical user interface 22 (Figures 1 - 7), prompts the user to respond to the incoming call, as described in Block 46. In response to the user's instructions, client terminal controller 18 instructs TPS 14 to connect the incoming call or not, as described in Block 48. If the user chooses to connect the call (i.e., answer the call, send the call to voice mail or send call to voice mail and monitor voice mail), TPS 14 signals call server 12 to connect the call, as described in Block 50, and TPS 14 signals client terminal 16 to stop notifying the user (e.g., stop phone from ringing), signals client terminal controller 18 of the status 36 (Figure 7) of the call and connects a voice path to client terminal 16 or voice mail storage device 25 (Figures 1 - 6), as described in Block 52. If client terminal controller 18 signals TPS 14 not to connect, TPS 14 signals client terminal 16 to stop notifying the user and does not

signal call server **12** at all, as described in Block **54**.

As discussed above, client terminal controller **18** performs a query to address book database **21** when an incoming call is detected. If the caller's phone number is not found in address book database **21**, client terminal controller **18** sends a query to LDAP server **23** within data network **24**, as described in Block **44**, Figure 9. Referring now to Figure 10, client terminal controller **18** (Figures 1 - 6) receives a reply from LDAP server **23** (Figures 1 - 6) and displays the caller's information on display screen **20** (Figures 1 - 7) via graphical user interface **22** (Figures 1 - 7), as described in Block **56**. The user can then choose to update address book database **21** (Figures 1 - 7), as described in Block **58** by automatically downloading LDAP reply information into address book database **21**. If the user chooses to update address book database **21**, client terminal controller **18** downloads the new information into address book database **21** as described in block **60**. Once the new information has been added to address book database **21**, the user can manage the incoming telephone call as discussed above and as described in Block **46**, Figure 9.

As discussed above, voice mail storage device **25** (Figures 1 - 6) is typically remote from client terminal **16**. Thus, it typically is not possible to determine who is being sent to voice mail or what voice mail message is being left, thereby preventing call screening of the incoming call. While caller ID features make it possible to determine who is calling, it still has not been possible to monitor the message being left because voice mail storage device **25** is remote from the user. However, one aspect of the present invention permits a user to not only monitor the voice mail message in real time as it is being left, but further allows a

user to interrupt the messaging process to take the call.

As discussed above, client terminal controller **18** (Figures 1 - 6) prompts the user to manage the incoming call, as described in Block **46**, Figure 9. Referring now to Figure 11, the user chooses to send the call to voice mail storage device **25** (Figures 1 - 6) as described in Block **62** and client terminal controller **18** sends a signal to TPS **14** (Figures 1 - 6) to connect the call to voice mail, as described in Block **64**. TPS **14** connects a speech path to client terminal **16** (Figures 1 - 6) (e.g., an IP phone) and signals client terminal **16** to mute the call (so that the caller cannot hear the user monitoring the call), as described in Block **66**. A conference call is then established with voice mail storage device **25** (Figures 1 - 6) through call server **12** (Figures 1 - 6), as described in Block **68**, and TPS **14** joins the call as described in Block **70**. Once the user is conferenced into voice mail storage device **25**, the user monitors voice mail storage device **25** as described in Block **72**, thereby establishing a three way call between client terminal **16**, voice mail storage device **25** and the incoming call, and TPS **14** sends a signal to client terminal controller **18** to indicate the voice mail monitor status, as described in Block **74**. If the user, via graphical user interface **22** (Figures 1 - 6), chooses to answer the call, client terminal controller **18** sends a signal to TPS **14** to answer the call, as described in Block **74**, and TPS **14** sends a signal to call server **12** to drop voice mail storage device **25** from the conference, as described in Block **78**.

It will be understood that various details of the invention may be changed without departing from the scope of the invention. Furthermore, the foregoing description is for the purpose of illustration only, and not for the purpose of limitation--the invention being defined by the claims.